

REMARKS

In response to the Office Action mailed March 1, 2007, Applicants respectfully request reconsideration. To further the prosecution of this Application, Applicants submit the following remarks, have cancelled claims and have added new claims. The claims as now presented are believed to be in allowable condition.

Claims 13, 15-18, 20 and 29-33 were pending in this Application. By this Amendment, claims 30 and 33 have been cancelled. Claim 13 has been amended to include the content of cancelled claim 30. Claim 34 has been added. Accordingly, claims 13, 15-18, 20, 29, 31, 32, and 34 are now pending in this Application. Claim 13 is an independent claim.

Preliminary Matters

The Office Action has not indicated the status of the formal drawings filed for the present Application on June 17, 2004. The Applicants respectfully request clarification as to the status of the formal drawings.

Claim Objections

Claim 33 was objected to under 37 CFR 1.75(c) as being of improper dependent form for failing to further limit the subject matter of a previous claim. Claim 33 has been cancelled. Cancellation of claim 33 should in no way be construed as an acquiescence to the objection and was done solely to expedite the prosecution of the Application.

Rejections under §103

Claims 13, 15, 18, 20, and 29-33 were rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,627,822 to Jackson et al. (hereinafter Jackson) in view of U.S. Patent No. 6,736,306 to Byun et al. (hereinafter Byun) and further in view of U.S. Patent No. 6,396,136 to Kalidas et

al. (hereinafter Kalidas). Claim 16 was rejected under 35 U.S.C. §103(a) as being unpatentable over Jackson and Kalidas as applied to claim 13 above, and further in view of U.S. Patent No. 6,600,220 to Barber (hereinafter Barber). Claim 17 was rejected under 35 U.S.C. §103(a) as being unpatentable over Jackson, Byun, and Kalidas as applied to claim 13 above, and further in view of U.S. Patent No. 6,787,920 to Amir (hereinafter Amir).

Applicants respectfully traverse the rejection of claim 30 and request reconsideration. The claims are in allowable condition.

Claim 30 (i.e., independent claim 13 as amended) was rejected under 35 U.S.C. §103(a) as being unpatentable over Jackson in view of Byun and further in view of Kalidas. Claim 13 relates to a method for manufacturing an area array package. The method includes coupling a grid array of primary electrical contacts to a coupling surface of a substrate within a central portion defined by the substrate, the grid array of primary electrical contacts configured to carry at least data signals between the area array package and a circuit board and forming the primary electrical contacts of the grid array as a plurality of primary solder balls, each primary solder ball of the grid array defining a first diameter. The method also includes coupling a series of secondary electrical contacts to the coupling surface of the substrate within a peripheral area defined by the coupling surface, the series of secondary electrical contacts configured to carry power signals between the area array package and the circuit board, the series of secondary electrical contacts separate from the grid array. The method also includes forming the series of secondary electrical contacts as a plurality of secondary solder balls, each secondary solder ball of the series defining a second diameter, the second diameter defined by each of the secondary solder balls being greater than the first diameter defined by each of the primary solder balls. Coupling the series of secondary electrical contacts comprises coupling the series of secondary electrical contacts to the coupling surface of the substrate, the

coupling surface configured to oppose a mounting surface of the circuit board, the substrate having at least one power plane, at least one ground plane, at least one plated through hole in communication with the at least one power plane, and at least one plated through hole in communication with the ground plane. The substrate has a contact pad in electrical communication with the at least one plated through hole in communication with the at least one power plane and electrically coupled with a secondary solder ball of the series of secondary electrical contacts. The substrate has a contact pad in electrical communication with the at least one plated through hole in communication with the at least one ground plane and electrically coupled with a secondary solder ball of the series of secondary electrical contacts. The secondary solder ball, contact pad, and the at least one plated through hole is in communication with the at least one power plane configured to carry power to the at least one power plane through the coupling surface. The secondary solder ball, contact pad, and the at least one plated through hole is in communication with the at least one ground plane configured to carry power from the at least one ground plane through the coupling surface.

The method also includes forming the substrate having a length that is greater than 45 mm and having a width that is greater than 45 mm. The step of coupling the grid array of primary electrical contacts to the coupling surface of the substrate includes coupling the grid array of primary electrical contacts to the coupling surface of the substrate in an array pattern of 50 columns having 50 primary electrical contacts per column within the central portion defined by the substrate, the grid array of primary electrical contacts configured to carry data signals between the area array package and a circuit board. The step of coupling the series of secondary electrical contacts to the coupling surface of the substrate includes coupling the series of secondary electrical contacts to the coupling surface of the substrate within the peripheral area defined by the coupling surface, the series of secondary electrical contacts configured to carry

power signals between the area array package and the circuit board, the series of secondary electrical contacts being separate from the grid array of primary electrical contacts and a sum of the primary electrical contacts and the secondary electrical contacts being greater than 2500 electrical contacts.

As indicated above, claim 30 was rejected under 35 U.S.C. §103(a) as being unpatentable over Jackson, Byun, Kalidas and legal precedent (i.e. *In re Rose*).

With respect to the rejection of claim 30, on page 9, paragraph 1, the Office Action recites that “Jackson, combined with Byun and Kalidas, does not specifically teach the method wherein the substrate has a length that is greater than 45 mm and has a width that is greater than 45 mm, nor that the primary electrical contact couple to [the] surface of the substrate in an array pattern of 50 columns having 50 primary electrical contacts per column within the central portion defined by the substrate, nor that a sum of the primary electrical contacts and the secondary electrical contacts being greater than 2500 electrical contacts.” The Office Action contends on page 9, paragraph 2 that “[a] change in size is generally recognized as being within the level of ordinary skill in the art. *In re Rose*, 105 USPQ 237 (CCOA 1955). The Office Action further recites that “mere dimensional limitations are *prima facie* obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical.”

Claim 30 (i.e., claim 1 as amended) is not *prima facie* obvious because the Applicants’ specification does provide disclosure as to the criticality of “forming the substrate having a length that is greater than 45 mm and having a width that is greater than 45 mm,” “coupling the grid array of primary electrical contacts to the coupling surface of the substrate in an array pattern of 50 columns having 50 primary electrical contacts per column within the central

portion defined by the substrate," and "coupling the series of secondary electrical contacts to the coupling surface of the substrate within the peripheral area defined by the coupling surface ... the series of secondary electrical contacts being separate from the grid array of primary electrical contacts and a sum of the primary electrical contacts and the secondary electrical contacts being greater than 2500 electrical contacts" as claimed by the Applicants.

For example, the Applicant's specification recites:

Substrates of conventional area array packages have lengths of approximately 45 mm and widths of approximately 45 mm. In the area array package 24, as shown in Fig. 2, the length 64 and width 66 of the substrate 26 are relatively larger than the lengths and widths of substrates of conventional area array packages. In one arrangement, the length 64 defined by the substrate is approximately 60 mm and the width 66 defined by the substrate is approximately 60 mm. ... ***The additional length 64 and width 66 of the substrate 26, compared to conventional area array package substrates, provide a location for a manufacturer to secure the additional series 52 of secondary electrical contacts 54 to the area array package 24, thereby increasing the amount of power received by the area array package 24 while maintaining the number of primary electrical contacts 50 of the grid array 48 configured to carry data signals.*** Page 13, line 26 through page 14 line 12, emphasis added.

The Applicants' specification further recites:

the series 52 of secondary electrical contacts 54 increases a number of electrical contacts of the area array package 24, as compared to a typical number of electrical contacts located on a conventional area array package. ***For example, conventional grid arrays have an array pattern of 50 columns having 50 electrical contacts (e.g., solder balls) per column.*** Such an array or grid configuration (50 x 50) results in the conventional grid array having a total of 2500 electrical contacts. In the present case, assume the grid array 48 includes 2500 electrical contacts 50. ***The series 52 of secondary electrical contacts 54 provide***

***additional electrical contacts for the area array package 24 such that the total number of electrical contacts 29 of the area array package 24 (e.g., the sum of the number primary electrical contacts 50 and the number of secondary electrical contacts 54) is greater than 2500, for example.*** Page 11, line 20 through page 12, line 9, emphasis added.

Formation of the substrate with a length and a width greater than the conventional 45 mm dimensions is critical to the manufacture of the claimed area array package. By forming the substrate with a length and width greater than 45mm the manufacturer can place additional power (i.e., secondary) contacts, greater than the conventional 2500 contacts, on the substrate to provide additional power to the area array package. Such formation of the substrate and placement of the contacts allows a manufacturer to avoid either (i) increasing the number of solder balls of a conventional 50 x 50 array that carry power signals to the ASIC, thereby reducing of the overall performance or processing speed of the ASIC (Applicants' specification, page 3, lines 1-8) or (ii) increasing the overall number of solder balls of the solder ball array while maintaining the conventional ASIC package size (45 mm x 45 mm) by decreasing the diameter and pitch of the solder balls, thereby decreasing the strength of the solder ball array and increasing the risk of fracture (Applicants' specification, page 3, lines 9-27). As recited in claim 30, forming the substrate having the length and the width that are greater than 45 mm is therefore critical to provide location for coupling of additional power (i.e., secondary) contacts to maintain "the overall performance of the area array package" (Specification page 5, lines 9-11).

For the reasons stated above, claim 13 as amended is not unpatentable over Jackson, Byun, and Kalidas either alone or in combination and the recitation of "forming the substrate having a length that is greater than 45 mm and having a width that is greater than 45 mm," "coupling the grid array of primary electrical contacts to the coupling surface of the substrate in an array pattern of 50 columns having 50 primary electrical contacts per column within the central

portion defined by the substrate," and "coupling the series of secondary electrical contacts to the coupling surface of the substrate within the peripheral area defined by the coupling surface ... the series of secondary electrical contacts being separate from the grid array of primary electrical contacts and a sum of the primary electrical contacts and the secondary electrical contacts being greater than 2500 electrical contacts" in claim 13 is not *prima facie* obvious.

Accordingly, claim 13 is in allowable condition and the rejection of claim 13 under 35 U.S.C. §103(a) should be withdrawn. Because claims 15-18, 20, and 29 depend from and further limit claim 13, claims 15-18, 20, 29, 31, and 32 are in allowable condition for at least the same reasons.

Additionally, it should be understood that the dependent claims recite additional features which further patentably distinguish over the cited prior art. For example, claim 31 recites "coupling the grid array of primary electrical contacts to the coupling surface of the substrate within the central portion defined by the substrate, the grid array of primary electrical contacts configured to carry data signals and power signals between the area array package and the circuit board." This feature is not taught or suggested by the cited prior art. If the rejection of claim 31 is to be maintained, the Applicants respectfully request that it be pointed out with particularity where the cited prior art teaches such a "coupling the grid array of primary electrical contacts to the coupling surface of the substrate within the central portion defined by the substrate, the grid array of primary electrical contacts configured to carry *data signals and power signals* between the area array package and the circuit board."

#### Newly Added Claims

Claim 34 has been added and is believed to be in allowable condition. Claim 34 depends from claim 13. Support for claim 13 is provided within the Specification, for example, on page 14, line 24 through page 15, line 21. No new matter has been added.

Conclusion

In view of the foregoing remarks, this Application should be in condition for allowance. A Notice to this affect is respectfully requested. If the Examiner believes, after this Amendment, that the Application is not in condition for allowance, the Examiner is respectfully requested to call the Applicants' Representative at the number below.

Applicants hereby petition for any extension of time which is required to maintain the pendency of this case. If there is a fee occasioned by this Amendment, including an extension fee, that is not covered by an enclosed check, please charge any deficiency to Deposit Account No. 50-3661.

If the enclosed papers or fees are considered incomplete, the Patent Office is respectfully requested to contact the undersigned collect at (508) 616-2900, in Westborough, Massachusetts.

Respectfully submitted,



Jeffrey J. Duquette, Esq.  
Attorney for Applicant(s)  
Registration No.: 45,487  
Bainwood, Huang & Associates, L.L.C.  
Highpoint Center  
2 Connector Road  
Westborough, Massachusetts 01581  
Telephone: (508) 616-2900  
Facsimile: (508) 366-4688

Attorney Docket No.: 1004-005

Dated: June 1, 2007